2.0
OVERVIEW OF MRBCA PROCESS

2.1 INTRODUCTION

This section presents an overview of the MRBCA process as it applies to petroleum underground and above ground storage tanks (UST/ASTs). The MRBCA process begins when a petroleum release is suspected or discovered and includes all subsequent activities (except those conducted under 260.500 through 260.550 RSMo and the regulations promulgated thereunder, as discussed at Section 1.3 of this document) until MDNR issues a "No Further Action" (NFA) letter for the release. Subsequent to site discovery and the control of any imminent hazards, the MRBCA process requires the following types of activities:

- Site Characterization and delineation of impacts in soil, groundwater, surface water, sediments and soil vapor, as applicable. The activities culminate in the development of a site conceptual model, which includes an exposure model;

- Risk assessment activities at the Tier 1, Tier 2, and Tier 3 level, as applicable. At Tiers 1 and 2, these activities culminate in the development of clean-up levels and, at all tiers, a determination of the nature and extent of necessary corrective action activities; and

- Corrective action activities that ensure human health and the environment are adequately protected from site-specific impacts under both current and reasonably anticipated future activities on and near the site.

Figure 2-1 illustrates the activities discussed above. Although these activities are fundamentally technical and rely on a variety of different scientific disciplines (geology, hydrology, engineering, chemistry, toxicology, land use planning, etc), they also entail making assumptions and policy choices that must be consistent with the policies and regulations established by MDNR. These policy choices and the specific steps of the MRBCA process are described in this section. Subsequent sections of this document describe the details of each step.

2.2 RISK-BASED CORRECTIVE ACTION PROCESS

The overall RBCA process for a site where a release of petroleum from an UST/AST system(s) is suspected or confirmed is illustrated in the flowchart at Figure 2-2 and is discussed below.

(Note: Generally, the word "site" is used to refer to the property where one or more tanks were located, and "offsite" refers to nearby properties. However, please note that certain terms used in this Guidance Document – e.g., "Site Characterization" and "Site Conceptual Model" – are intended to refer to multiple properties and include all areas

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which are or may be impacted by the petroleum release.)

2.2.1 Site Discovery

The MRBCA process begins with the discovery of a contaminated or potentially contaminated UST/AST site. A site might be discovered and reported to the MDNR under a variety of circumstances including, but not limited to, (i) system closure, (ii) a site check investigation resulting in confirmation of a release, and (iii) identification of an imminent hazard (e.g., vapors in sewers or buildings, etc.). Sites might also be identified during investigations conducted as a part of real estate transactions, investigations conducted in anticipation of land development, and the occurrence of accidents and spills.

The site discovery process should generally result in the identification of, and generation of analytical data for, affected media at a site. This initial data should, ideally, represent the point or points of release, the chemicals of concern (COCs), and the maximum concentrations of the COCs.

The process of site discovery and reporting is discussed in further detail in Section 3.0 of this document.

2.2.2 Comparison with Default Target Levels

This step involves the comparison of maximum site concentrations with the default target levels (DTLs – found at Table 3-1 of this document) and occurs after a release has been confirmed and affected media have been identified and sampled. If the maximum media-specific concentrations at a site are less than the DTLs, and provided the site poses no obvious risk to ecological receptors, MDNR will issue a NFA letter pertaining to the site. In such case, an ecological screening assessment as per subsections 5.5.5 and 6.6 of this guidance will not be required.

If the maximum soil or groundwater concentrations exceed the DTLs, the person performing the evaluation may either adopt DTLs as the cleanup levels and develop a Corrective Action Plan (CAP) to achieve those levels, or perform a tiered risk assessment.

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Since MDNR may issue a NFA letter for the release based on a comparison of concentrations of COCs found on the site with the DTLs, the data available for the comparison must accurately represent the maximum media-specific COC concentrations. A NFA determination at this step means that the concentrations of COCs present at the site do not pose an unacceptable risk to human health or the environment, regardless of how the site may be used or developed in the future.

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Note that "maximum concentration" refers to the current maximum concentration of a COC. At sites where remedial activities or additional releases may have occurred since the time samples were collected, new data will be necessary to represent current conditions.

2.2.3 Development and Validation of Site Conceptual Model

If the relevant maximum concentrations of COCs exceed the DTLs and the DTLs are not selected as the cleanup levels, a site conceptual model (SCM) must be developed and validated. A SCM provides the framework for the overall management of a site and should help guide data collection and, subsequently, corrective action activities at the site. The SCM is conceptual rather than tangible, though the evaluator might find written notes, diagrams, and flow charts beneficial in developing the SCM. While the SCM will not be submitted to MDNR, the data resulting from SCM validation will be.

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Key elements of the SCM include (i) release scenario, contaminant source, and COCs, (ii) an exposure model (EM) that focuses on the receptors, pathways and routes of exposure under current and reasonably anticipated future land use conditions, (iii) site stratigraphy and hydrogeology, and (iv) spatial and temporal distribution of COCs. An important part of this step is the validation of the SCM through the collection of site-specific data. The validation process is similar to the traditional site investigation step in that it may involve, for instance, installation and sampling of monitoring wells and collection of soil data both on-site and off-site. Additionally, validation involves the determination of land use and the development of an EM. At sites that are currently undergoing investigation or corrective action, this step may involve the compilation of relevant historic data, identification of data gaps, and the collection of missing data so that a tiered risk assessment can be completed.

Data needs for a tiered risk assessment are presented in Section 5.0.

2.2.4 Tier 1 Risk Assessment

A Tier 1 risk assessment requires the (i) selection of relevant Tier 1 risk-based target levels (RBTLs) from lookup tables developed by MDNR, and (ii) comparison of these levels with representative concentrations (note that, at Tier 1, representative rather than maximum concentrations are compared to the target levels, except for surficial soil in a residential setting, for which maximum concentrations are used). Tier 1 RBTLs will be selected for each COC, each complete pathway, and each media of concern identified in the EM. The Tier 1 RBTLs can be found in Tables 7-1 through 7-6(c) in Section 7.0 of this document.

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Based on the comparison of representative concentrations and Tier 1 RBTLs, one of the following three decisions is possible:

- Request a NFA letter from MDNR if the representative concentrations (or, for surficial soil in a residential setting, maximum concentrations) do not exceed the RBTLs and other conditions for issuance of a NFA have been met (e.g., necessary activity and use limitations (AULs) in place, no ecological concerns, etc.),

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- Adopt Tier 1 RBTLs as the cleanup levels and prepare and submit a CAP to achieve these levels, or

- Perform a Tier 2 risk assessment.

The specific decision made must be documented and provided to MDNR. Upon completion of the Tier 1 risk assessment, the person who conducted the evaluation or who is responsible for the site shall provide their recommendations to MDNR. Note, however, that if a Tier 2 evaluation immediately follows the Tier 1 assessment, the evaluator need not submit a report pertaining solely to the Tier 1 assessment. Rather, the Tier 1 and Tier 2 assessments may be combined into a single report that is submitted at the conclusion of the Tier 2 assessment.

Details of Tier 1 risk assessment are provided in Section 7.0.

2.2.5 Tier 2 Risk Assessment

Depending on site-specific conditions and the availability of data, conducting a Tier 2 risk assessment might depend on the collection of additional site-specific data. In preparation for a Tier 2 risk assessment, the EM should be revised, if necessary, and, as appropriate, additional data collected. This data would be used to develop Tier 2 site-specific target levels (SSTLs) in accordance with the provisions of Section 8.0 of this guidance.

After the Tier 2 SSTLs have been developed, they will be compared with representative COC concentration data from the site. Depending on the comparison, the following three options are possible:

- Request a NFA letter from MDNR if the representative concentrations (or, for surficial soil in a residential setting, maximum concentrations) do not exceed the Tier 2 SSTLs for all complete routes of exposure and other conditions for issuance of a NFA have been met (e.g., AULs in place, no ecological concerns, etc.),

- Adopt Tier 2 SSTLs as cleanup levels and develop a CAP to achieve these levels, or

- Develop a work plan to perform a Tier 3 risk assessment.

Details of Tier 2 risk assessment are presented in Section 8.0.

2.2.6 Tier 3 Risk Assessment

A Tier 3 risk assessment allows considerable flexibility to the person conducting the evaluation. Because of the myriad options available at Tier 3, MDNR requires that a work plan be prepared for MDNR's review and approval prior to a Tier 3 risk assessment.

Once Tier 3 SSTLs have been developed, they are compared to representative COC

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concentrations from the site. This comparison will result in one of the following two options:

- Request a NFA letter from MDNR if the representative concentrations (or, for surficial soil in a residential setting, maximum concentrations) do not exceed the Tier 3 SSTLs and other conditions for NFA have been met (e.g., AULs in place, no ecological concerns, etc.), or

- Adopt Tier 3 SSTLs as cleanup levels and develop and implement a CAP.

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Details of Tier 3 risk assessment are presented in Section 9.0.

2.2.7 Development and Implementation of Corrective Action Plan

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This step involves the development and implementation of a Corrective Action Plan (CAP) to achieve the cleanup levels approved by MDNR. Typically, a CAP will be developed after media-specific cleanup levels have been approved by MDNR. The CAP may include a combination of active and passive remedial options and/or AULs and a description of what reports will be submitted and when. As appropriate, the plan should include (i) the type of technology to be used, (ii) an explanation of AULs being proposed, if any, and justification of their use, (iii) an estimate of the time needed to implement the CAP, (iv) data that will be collected to monitor the effectiveness of the CAP, (v) the manner in which the data will be evaluated, and (vi) steps that will be taken if the CAP is not effective. During implementation of the CAP, sufficient data must be collected and analyzed to allow for an appropriate evaluation of the performance of the plan so that modifications can be made as appropriate. The CAP should not be implemented without the approval of MDNR.

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The data collected during implementation of the CAP should be carefully evaluated and a determination made whether the CAP is progressing as anticipated. The data and the evaluation shall be submitted to MDNR. If the CAP is not progressing as anticipated and as predicted in the work plan, a proposal for modifying the CAP should be developed and submitted to MDNR. Modifications of the CAP shall not be implemented without the concurrence of MDNR.

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CAP details are presented in Section 10.0.

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2.2.8 No Further Action under the MRBCA Program

The overall objective of all CAPs is to ensure protection of human health and the environment under current and reasonably anticipated future conditions. When MDNR is satisfied that cleanup levels have been met or risks have been otherwise managed, MDNR will issue a NFA letter for the site. MDNR's issuance of a NFA letter indicates that, based on the MRBCA evaluation submitted and the information available to MDNR at the time, no further action is necessary to protect human health and the environment. However, if in the future additional information becomes available that indicates that the site poses

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unacceptable risk to human health or the environment, MDNR may rescind their decision and require further action at the site.

2.3 RISK-BASED TARGET LEVELS WITHIN THE MRBCA PROCESS

Any of the following may be used as corrective action standards, subject to the restrictions described below:

DTLs are the most conservative chemical and medium-specific concentrations that allow unrestricted (residential) use of the property. For each COC and each medium, the DTL is the lowest of the Tier 1 RBTLs. Since DTLs are the most conservative levels, their application does not require evaluation of site-specific exposure pathways, the development of a site conceptual model, any activity and use limitations, or the determination of whether groundwater is used, or is likely to be used, as a water supply source. DTLs are convenient screening levels to use, for example, in Phase II assessments.

Tier 1 RBTLs are generic target levels developed by MDNR using conservative default parameters that depend on the receptor, media, pathway, route of exposure, and whether impacted or threatened groundwater is used, or is likely to be used, as a water supply source. Use of RBTLs may require AULs.

Tier 2 SSTLs are site-specific target levels that are calculated using site-specific data and the guidelines included in this document. Tier 2 SSTLs differ from Tier 1 RBTLs in that the Tier 2 SSTLs are based on site-specific fate and transport parameter values whereas the Tier 1 RBTLs use default, generic fate and transport parameters. Typically but not always Tier 2 SSTLs will be higher than Tier 1 RBTLs. *Because Tier 2 SSTLs are based on actual site conditions, once developed, Tier 2 SSTLs will apply even if they are lower than the Tier 1 RBTLs for that property.* If the Tier 2 SSTLs are higher than the Tier 1 RBTLs, either Tier 1 RBTLs or Tier 2 SSTLs may be used. As with the Tier 1 RBTLs, depending on the circumstances, AULs may be required when SSTLs apply.

Tier 3 SSTLs are site-specific target levels that are calculated using data collected at the site and the guidelines included in this document. Compared with Tier 2 SSTLs, Tier 3 SSTLs may be based on the application of fate and transport models other than those used to calculate the Tier 1 RBTLs and Tier 2 SSTLs. *As with Tier 2 SSTLs, if the Tier 3 SSTLs developed for a site are lower than the Tier 2 SSTLs or the RBTLs, the Tier 3 SSTLs must be applied.* The application of Tier 3 SSTLs might also require the use of AULs, depending on the specific circumstances.

Table 2-1 presents the differences between the different target levels within this framework.

2.4 DOCUMENTATION OF THE MRBCA PROCESS

To facilitate and allow decisions to be made that are protective of human health and the environment, the MRBCA process requires the collection and analysis of a considerable

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As a site moves through this tiered process, the following can be anticipated:¶
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<#>Higher tiers will require the collection of additional site-specific data, which will increase data collection, data analysis, and labor costs. Simultaneously, there will be a reduction in the overall uncertainty about the site.¶
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<#>In general, the calculated Tier 2 SSTLs will be higher than the Tier 1 RBTLs because lower tier levels are designed to be more conservative than higher tier levels. Thus, the cost of risk management activities at higher tiers should generally be lower.¶
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<#>The need for, and the extent of, regulatory oversight and review will increase.¶
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<#>The level of uncertainty and conservatism will decrease due to the availability of more site-specific data.¶
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Despite the above differences, there is one very significant similarity: each tier will result in cleanup target levels that provide an acceptable level of protection to human health and the environment.¶

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amount of data. The outcome of the MRBCA process is of considerable interest to a variety of stakeholders, including but not limited to, MDNR, land owners, developers, lending agencies, and cities and municipalities. Therefore, the process by which data is collected and analyzed and important decisions potentially affecting human health and the environment are made must be as transparent as possible via adequate and clear communication between the person responsible for a site and the MDNR. Such communication must occur throughout the MRBCA process, from site discovery to issuance of a NFA letter, so that interested parties can determine if decisions made and activities undertaken during the MRBCA process at a site were sufficient to adequately protect human health and the environment.

The method and format by which the owner/operator reports data developed under the MRBCA process must be consistent (across the state) and unambiguous so that interested parties can readily understand the:

- Nature and extent of the problem at a site,
- Sequence of actions taken to address the problem,
- Data collected to quantify and analyze the problem,
- Process used to develop a plan of action to address the problem,
- Results of the actions taken, and
- Finally, whether the actions taken are adequately protective of human health and the environment under current and reasonably anticipated future conditions.

To facilitate this type of reporting, Table 2-2 was developed. Table 2-2 presents a comprehensive list of reports that would typically be submitted to MDNR, an approximate schedule for submittal of the various reports, and a description of the format in which these reports would be submitted. Detailed discussions of these reports are presented in Section 12.0 of this document. Section 12.0 identifies:

- The specific reports that must be submitted to MDNR,
- Data that must be included in each report,
- The required reporting format for each report, and
- A schedule for submission of the reports to MDNR.

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